UNITED STATES PATENT AND TRADEMARK OFFICE

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PO BOX 3001
BRIARCLIFF MANOR, NY 10510-8001

EXAMINER
ODOM, CURTIS B

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/30/2006*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-13* is/are rejected.

7)☒ Claim(s) *7 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

DETAILED ACTION

Claim Objections

1.   Claims 5 and 6 are objected to because of the following informalities:

   a.   In claim 5, the word "flowing" is suggested to be changed to "following".

   b.   Claim 6 is suggested to end in a period.

   Appropriate correction is required.

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed
> in the United States before the invention by the applicant for patent or (2) a patent granted on an application for
> patent by another filed in the United States before the invention by the applicant for patent, except that an
> international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this
> subsection of an application filed in the United States only if the international application designated the United
> States and was published under Article 21(2) of such treaty in the English language.

3.   Claims 1, 2, 6, 8, 9, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by

Kwon et al. (U. S. Patent No. 6, 587, 451).

   Regarding claims 1 and 8, Kwon et al. discloses a mobile terminal (see Fig. 2) with

multiple elements, comprising:

   a receiving unit (see Fig. 2), for receiving the corresponding Rx vector signals from

multiple antenna elements (ANT 1);

a calculating unit (Fig. 2, block 38), for calculating the suitable weight vector (see

column 9, line 39-column 10, line 28, in particular Equations 16-20) corresponding to the Rx

vector signal of each element according to the corresponding Rx vector signals; and

a combining unit (see Fig. 2, elements 40 and 41, blocks 49 and 50, column 7, lines 23-28

and 52-60), for weighting and then combining the Rx vector signals with the corresponding

suitable weight vectors respectively, wherein the weight vector obtains an beamformer

(combined) output signal with maximum SNR (see column 9, line 53-column 10, line 28).

Regarding claims 2 and 9, Kwon et al. discloses calculating the autocorrelation matrix

(Ryy) of the Rx vector signals with statistical method in time dimension (see Equation 8), and

calculates the suitable weight vector (see Equation 15-20) according to the autocorrelation matrix

(Ryy) of the Rx vector signals.

Regarding claims 6 and 13, Kwon et al. discloses wherein the statistical method

in time dimension is performed on the Rx vector signals over the chosen time range (symbol

interval as disclosed in column 8, lines 10-12) in the Rx vector signals so as to get the

autocorrelation matrix (Ryy) corresponding to the Rx vector signals over the chosen time range

in the Rx vector signals, wherein the determined suitable weight vector (see column 9, line 39-

column 10, line 28) is the suitable weight vector corresponding to the Rx vector signals over the

chosen time range, the calculating unit calculates the autocorrelation matrix of subsequent Rx

vector signals using a time update (see column 10, lines 38-49, Equations 21-23) according to

the autocorrelation matrix (Ryy(k-1)) of the Rx vector signals over the chosen time range, and

determines the suitable weight vector of the subsequent Rx vector signals according to the

suitable weight vector $w_l(k)$ of the Rx vector signals over the chosen time range (see Equation

17) and the autocorrelation matrix (see Equations 16-18) of the subsequent Rx vector signals

which use the time updates to solve for Ryy of subsequent vector signals as disclosed in column

10, lines 38-49).

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

4.   Claims 3-5 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Kwon et al. (U. S. Patent No. 6, 587, 451) in view of Sim (US 2002/0196767).

        Regarding claims 3-5 and 10-12, Kwon et al. discloses calculating an auto-correlation

matrix for use in determining the weight vector (see column 7, line 66-column 8, line 20).

        Kwon et al. does not disclose calculating the autocorrelation matrix of the vector channel

responses according to the Rx vector signals; calculating the autocorrelation matrix of the vector

noise according to the autocorrelation matrix of the vector channel responses and the

autocorrelation matrix of the Rx vector signals; and calculating the suitable weight vector

corresponding to the signal at the chosen time in the Rx vector signals according to the

autocorrelation matrix of the vector channel responses and the autocorrelation matrix of the

vector, wherein the signal at the chosen time in the Rx vector signals is the sig al at each time in

the Rx vector signals, wherein the calculating unit calculates the suitable weight vector Wopt according to the following formula: $Rhh * W = \lambda * Rzz * W$.

However, Sim discloses calculating combining weights also in a multiantenna receiver comprising of a weight vector calculation section (Fig. 5, block 305) for calculating (see sections 0084-0086, Equation 3) the autocorrelation matrix (Rvv) of the vector channel responses (estimation) of the DPCCH channel (see section 0044) according to the Rx vector signals; calculating the autocorrelation matrix (Ruu) of the vector noise/interference (see sections 0084 and 0086) according to the autocorrelation matrix of the vector channel responses and the autocorrelation matrix of the Rx vector signals; and calculating the suitable weight vector (see section 0086, Equation 3) corresponding to the signal at the chosen time in the Rx vector signals according to the autocorrelation matrix of the vector channel responses and the autocorrelation matrix of the vector, wherein the signal at the chosen time in the Rx vector signals is the signal at each time in the Rx vector signals (see section 0048-0049, Equation 1), wherein the calculating unit calculates the suitable weight vector Wopt according to the following formula (see Equation 3): $Rvv * W = \lambda * Ruu * W$, wherein Rvv=Rrr, and Ruu=Rzz. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the method/device of Kwon et al. with the teachings of Sim since Sim states the weight vectors improve communication quality (see sections 0106-0107).

Allowable Subject Matter

5.   Claims 7 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to CURTIS B. ODOM whose telephone number is (571)272-3046. The examiner can normally be reached on Monday- Friday, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Curtis B. Odom/
Primary Examiner, Art Unit 2611
July 4, 2010